

## Chapter 4.1 GROUND WATER PROTECTION PROGRAMS

Ground water programs in Virginia strive to maintain existing high water quality through adopted statutes, regulations, and policies. Advancing ground water protection efforts is the goal of many state programs in numerous state agencies. In late 1986 an interagency committee was formed to stimulate, strengthen, and coordinate ground water protection activities in Virginia. The Ground Water Protection Steering Committee (GWPSC) continues to meet bi-monthly with representation from the following agencies:

Department of Environmental Quality (DEQ)  
Department of Health (VDH)  
Chesapeake Bay Local Assistance Department (CBLAD)  
Department of Mines, Minerals, and Energy (DMME)  
Virginia Polytechnic and State University (VPI&SU)  
Department of Housing and Community Development (VDH&CD)  
Department of Agriculture and Consumer Services (VDACS)  
Department of Conservation and Recreation (DCR)  
Department of General Services, Division of Consolidated Laboratories (DCLS)  
Department of Business Assistance (DBA)  
US Geologic Survey (USGS)

The following paragraphs briefly describe ground water protection activities at member agencies. Information provided in Tables 4.1-1, 4.1-2, 4.1-3 and 4.1-4 is presented for the Commonwealth as a whole. System upgrades at the VDH prevented manipulation of listed parameters and detections/violations for public water supply data. In addition, budgetary constraints within the Commonwealth prevent coordinated data collection activities designed to characterize ambient ground water quality and changes to that quality over time on a statistically valid statewide basis.

### Wellhead Protection Efforts

Building grassroots support for ground water and wellhead protection continue to be priorities of the GWPSC. Accomplishments during this reporting period include the development and distribution of a publication on wellhead protection activities in the Commonwealth (Wellhead Protection: Case Studies of Six Local Governments in Virginia), hosting three one-day workshops, and the voluntary completion of two Biennial Wellhead Protection Reports (see Table 4.1-1). Future efforts will include cooperating with the Virginia Department of Health on source water protection issues. Funding for GWPSC activities, including wellhead protection, is provided through DEQ's Federal Ground Water Protection Grant.

**Table 4.1-1 Public Water Supply Systems and Population Served  
from Virginia's 1997 Biennial Wellhead Protection Report**

Total Number of Public Water Supply (PWS) systems	4,003
Total Number of GW-Dependent PWS Systems	3,711
Total Number of Community Water Supply Systems	1,400
Total Number of GW-Dependent Community Water Supply Systems	1,132
Total Population Relying on Community Water Supply Systems	6,224,601
Total Population Relying on GW-Dependent Community Water Supply Systems	668,764

Total Number of GW-Dependent Non-Transient Non-Community PWS Systems	638
Total Number of GW-Dependent Transient Non-Community PWS Systems	1,942

### Ground Water Management Act of 1992

The 1992 session of the Virginia General Assembly adopted the Act and repealed the Ground Water Act of 1973. The Act establishes criteria for the creation of ground water management areas and requires person who withdraw more than 300,000 gallons of ground water per month to obtain permits. The Act requires that previously exempted agricultural ground water withdrawals obtain ground water withdrawal permits. The DEQ adopted regulations to implement the Act in September of 1993. This regulation is currently in the process of amendment to include specific requirements for agricultural ground water withdrawal permits and to require DEQ to perform technical evaluations of proposed withdrawals.

### Underground Storage Tank (UST) Program

The DEQ currently maintains records on some 74,000 regulated USTs at 25,000 facilities in Virginia. The UST program maintains a computer database of all UST information and tracks the reporting of installations, upgrades, repairs, and closures. Local building/fire officials assist the program by permitting UST activities statewide. Compliance monitoring is performed on a periodic basis and includes computer searches, outreach through presentations and informational mailings, compliance mailings, and random site inspections. By December 22, 1998 all existing (pre-1988) USTs must be upgraded to new tank standards, replaced, or closed. The DEQ conducted 6,000 UST inspections during 1997 to inform owners of this deadline. Federal grant funds and matching State funds support this program.

### Leaking Underground Storage Tank (LUST) Program

The LUST side of the UST program is involved in overseeing leaks from underground storage tanks. Regional Office Ground Water staff perform initial investigations and direct owners/operators to take appropriate remediation activities. Regional Office staff review all required reports and issue corrective action plan (CAP) permits as needed. Central office staff provide audit/review of regional office approved site characterization (SCR) reports and CAPs and assist the regional staff as necessary. To assist owners and operators with UST releases, the tank program maintains procedures for UST owners/operators to obtain reimbursement for certain corrective action costs and third party claims through the Virginia Petroleum Storage Tank Fund (VPSTF). A combination of Federal LUST Trust Funds and VPSTF monies are used to implement this effort.

In cases where owners/operators cannot be identified or are unable to act effectively the DEQ LUST staff utilize a private contractor to investigate and cleanup. The LUST staff also manages the alternate water supply (AWS) effort and provides technical review of reimbursement requests for reimbursing owners/operators who have spent more than their limit of financial responsibility.

### Aboveground Storage Tank (AST) Program

The DEQ has proposed a new regulation that will consolidate three existing regulations and aid DEQ efforts to eliminate duplication in regulations, provide uniformity in regulation, streamline government services, and increase performance and efficiency. The existing regulations relate to the 9,968 presently registered ASTs/facilities located in the Commonwealth that have an individual AST capacity of 660 gallons or an aggregate facility capacity of 1,230 gallon or more of oil. Proposed additions to the regulations will establish criteria for granting variances from the AST Pollution Prevention Requirements and will allow DEQ to evaluate and take the necessary steps to accept US

Coast Guard and EPA approved response plans either wholly or with state specific information added. Registration fees, "Oil Discharge Contingency Plan" fees, and State funds support the AST program.

### Waste Permitting Activities

The Resource Conservation and Recovery Act (RCRA) Base Program addresses ground water quality issues at both permitted and unpermitted land-based units. Information provided in Table 4.1-3 RCRA Corrective Action category is for non Hazardous and Solid Waste Amendment (HWSA) sites and is divided into two sectors. The term "sites" refers to facilities; most facilities have more than one regulated unit. There are a total of 47 units among the 29 facilities. The "Base Program Correction Action" sites or "Little C" sites are permitted units required to perform corrective action if the ground water concentrations exceed established Ground Water Protection Standards. The second sector is "Unpermitted Land Disposal Facilities (LDF)" where continued operation of the facility is contingent upon removal or decontamination of contaminated media. In instances where the LDF is closed, ground water monitoring is required to demonstrate that closure performance standards are met. When standards are not met, the site is issued a Post Closure Permit and corrective action is undertaken.

Included in Table 4.1-3 are ground water contamination statistics from the DEQ's Federal Facilities Restoration and Superfund Office. The Federal Facilities Restoration activities include Department of Defense (DOD) installations (Army, Navy, Air Force, Defense Logistics Agency, and Formerly Used Defense Sites) and a NASA installation for a total of 33 installations. Currently eight Federal Facilities are listed on the National Priority List (NPL) and 25 non-NPL sites. Base Realignment and Closure is occurring at seven facilities. Federal funding from the Department of Defense supports the Federal Facilities Restoration program. The Superfund Program, funded with both Federal and State dollars, carries out activities required by law or legal agreements at 20 NPL sites. Two of these sites have now been cleaned up and delisted. Additional activities within this Office include DEQ's Voluntary Remediation Program and the Brownfields Program. The Voluntary Remediation Program provides a mechanism for eligible participants to voluntarily clean up properties not mandated for remediation under existing environmental laws. This program serves as a mechanism for cleanup of Brownfield sites. There are currently 75 Brownfield sites that are either potential candidates for clean up, formally in the program or have been cleaned up under the program. A combination of registration fee and EPA funding supports the Voluntary Remediation Program. The DEQ's Brownfields Program, funded through EPA, is currently under development. None of these four programs currently collect ground water quality data; they do receive and review data collected by outside sources.

### Pesticide Disposal Program

The VDACS, in cooperation with the Virginia Pesticide Control Board, has conducted a highly popular Pesticide Disposal Program since 1990. As of October, 1997 more than 240 tons of unwanted pesticides have been collected from 1455 agricultural producers, pesticide dealers and commercial pest control firms located in 83% of Virginia's counties and independent cities and disposed of safely. Collection and disposal of agricultural pesticides will be carried out in the remaining counties in 1998. The pesticide disposal program has benefitted from a high level of interagency cooperation among the VDACS, DEQ, DCR, DCLS, and Virginia Cooperative Extension. Funding to support this program has been pooled from Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and Clean Water Act (Sections 319 Non Point Source and 106 Ground Water Protection) grants and the Office of Pesticide Services program fees.

### Pesticide and Ground Water Management Plan

In response to the EPA Pesticides and Ground Water Strategy, the VDACS formed a task force in 1992. This committee comprised of representatives from the water user community, four representatives from the GWPSC, four representatives from the agricultural community, a member from the Board of Agriculture and one from the Virginia Pesticide Control Board. The objective of the

task force was to draft a Generic State Management Plan (GSMP) for pesticides and ground water. GSMP development was cooperatively funded by the VDACS, DCR, and DEQ through EPA FIFRA, Clean Water Act (Sections 319 Non Point Source and 106 Ground Water Protection) grants. The completed GSMP was submitted to EPA Region III in 1993 and received EPA concurrence in 1995. The GSMP established a graduated response plan for pesticides detected in ground water, a process for developing pesticide specific management plans (PSMP) should such be required by anticipated federal rule making and a graduated response approach for managing pesticides identified as potential threats to ground water.

#### Pesticides in Ground Water Monitoring Project

In preparation for implementation of PSMPs, the VDACS initiated a pilot monitoring project in September, 1994 and completed in March, 1996. A total of 49 shallow bored wells were sampled in eight localities. Samples were analyzed for alachlor, atrazine, cyanazine, metolachlor, simazine and nitrates. At least one pesticide was detected in nine of the wells. One well exceeded the Maximum Contaminant Level (MCL) established under the Safe Drinking Water Act for alachlor (2 ppb) with a detection of 9 ppb. Thirty four wells had detectable levels of nitrate. Seven wells exceeded the MCL established under the Safe Drinking Water Act of 10 ppm. The highest level of nitrate was 17.2 ppm.

#### CIBA Atrazine Monitoring Study

The VDACS cooperated in a Atrazine Monitoring Study with CIBA Ag Chemicals in 1994. Under this study, 64 drinking water wells were sampled and analyzed for atrazine, simazine, prometon, propazine, ametryn, prometryn, metalaxyl, metolachlor, cyanazine, three metabolites of atrazine, and nitrates. At least one pesticide was found in 19 wells. However, concentrations were generally very low. No wells had pesticide residues at or above the MCL. Fifty three wells had detectable levels of nitrate and sixteen of these wells had levels of nitrates at or above the MCL of 10 ppm.

#### Cat Point Creek Watershed-Shallow Ground Water Monitoring

The DCR, in cooperation with the Tidewater Resource Conservation and Development Council, initiated a ground water monitoring study in the Cat Point Creek watershed in December, 1995. Land use in the watershed is dominated by rowcrop agriculture, grasslands, and forestry. The purpose of this ground water study was to begin a multiple-year process to evaluate the effectiveness of integrated crop management (ICM) in reducing the loading of nitrate and pesticides to the shallow water-table aquifer. ICM incorporates nutrient management and pest management into one plan to be followed by producers. In this study, two producers implemented ICM at three different study sites (sites 1-3) beginning in the spring of 1996. A well cluster, consisting of three wells per cluster, was established in each of the ICM fields and in the control fields. Ground water samples for nutrients were collected twice a month between February and July and on a monthly basis for all other months. Pesticide samples were collected in May and November of 1996. Atrazine was the only pesticide detected in ground water and it was only found in samples collected at the ICM and control fields at site 1 in May, 1996. Pesticides were not detected in any of the November, 1996 samples. Ground water monitoring activities were funded through the DEQ's Federal 106 Ground Water Protection Grant.

#### Polecat Creek Watershed-Shallow Ground Water Monitoring

The CBLAD initiated ground water monitoring for nitrates as part of the Polecat Creek Watershed project in June 1997. Activities are funded by the Clean Water Act, Section 319 Non Point Source grant funds. The USGS is conducting the ground water monitoring in Caroline County. There are two well transects installed adjacent to agricultural land uses. Pending grant applications include expanding the well transects to residential, commercial, and forested areas. The USGS will be determining flow periods, history, and chemistry for ground water in this watershed and, ultimately,

attempting to learn if pollution is flowing into surface waters through ground water.

#### Ground Water Protection Program Conclusion

Ground water programs in Virginia strive to maintain the existing high water quality. The Virginia Ground Water Protection Steering Committee (GWPSC), established in 1986, continues to meet bi-monthly as a vehicle for sharing information, for directing attention to important ground water issues, and for taking the lead on ground water protection initiatives requiring an inter-agency approach. This inter-agency advisory committee is designed to stimulate, strengthen, and coordinate ground water protection activities in the Commonwealth. Ground water protection activities in the Commonwealth are as varied as the funding sources that support them.

**Table 4.1-2 Major Sources of Ground Water Contamination**

Contaminant Source	Ten Highest-Priority Sources(√) <sup>(1)</sup>	Factors Considered in Selecting a Contaminant Source <sup>(2)</sup>	Contaminants <sup>(3)</sup>
<b>Agricultural Activities</b>			
Agricultural chemical facilities			
Animal feedlots			
Drainage wells			
Fertilizer applications	√	(F) State GW Protection Strategy	(E)
Irrigation practices			
Pesticide applications	√	(F) State GW Protection Strategy	(A,B)
<b>Storage and Treatment Activities</b>			
Land application	√	(F) State GW Protection Strategy	(E)
Material stockpiles			
Storage tank (above ground)			
Storage tank (underground)	√	(F) State GW Protection Strategy	(D)
Surface impoundments	√	(F) State GW Protection Strategy	(E)
Waste piles			
Waste tailings			
<b>Disposal Activities</b>			
Deep injection wells			
Landfills	√	(F) State GW Protection Strategy	(M) 40 CFR-App IX
Septic systems	√	(F) State GW Protection Strategy	(J)
Shallow injection wells			
<b>Other</b>			
Hazardous waste generators			
Hazardous waste sites			
Industrial facilities			
Material transfer operations			
Mining and mine drainage	√	(F) State GW Protection Strategy	(M) Acid Leachate
Pipeline and sewer lines			
Salt storage and road salting			
Salt water intrusion	√	(F) State GW Protection Strategy	(G)
Spills			
Transportation of materials			
Urban runoff	√	(F) State GW Protection Strategy	(M) NPS pollutants such as fertilizers & heavy metals
Other sources (please specify)			

A-Inorganic Pesticides  
 B-Organic Pesticides  
 C-Halogenated Solvents  
 D-Petroleum Compounds

H-Metals  
 I-Radionuclides  
 J-Bacteria  
 K-Protozoa

**Table 4.1-3 Summary of State Ground Water Protection Programs**

Programs or Activities	Check* (√) <sup>(1)</sup>	Implementation Status <sup>(2)</sup>	Responsible State Agency(3)
Active SARA Title III Program	√	fully-estab.	DEQ
Ambient ground water monitoring system			
Aquifer vulnerability assessment	√	under devel.	VDCR
Aquifer mapping			
Aquifer characterization			
Comprehensive data management system			
EPA-endorsed Core Comprehensive State Ground Water Protection Program (CSGWPP)			
Ground water discharge permits (VPA)	√	fully-estab.	DEQ
Ground water Best Management Practices			
Ground water legislation (Quantity)	√	fully-estab.	DEQ
Ground water classification			
Ground water quality standards	√	fully-estab.	DEQ
Interagency coordination for ground water protection initiatives	√	fully-estab.	DEQ
Nonpoint source controls	√	cont. efforts	VDCR
Pesticide State Management Plan (Generic)	√	fully estab.	VDACS
Pollution Prevention Program			
Resource Conservation and Recovery Act (RCRA) Primacy	√	fully-estab.	DEQ
Source Water Assessment Program		under development	VDH
State Superfund	√	under revision	DEQ
State RCRA Program incorporating more stringent requirements than RCRA Primacy			
State septic system regulations	√	fully-estab.	VDH
Underground storage tank installation requirements	√	fully-estab.	DEQ
Underground Storage Tank Remediation Fund	√	fully-estab.	DEQ
Underground Storage Tank Permit Program	√	fully-estab.	DEQ
Underground injection Control Program			
Vulnerability assessment for drinking water/wellhead protection			
Well abandonment regulations	√	fully-estab.	VDH
Wellhead Protection Program (EPA-approved)			
Well Installation regulations		fully estab.	VDH

**Table 4.1-4 Ground Water Contamination Summary**

Aquifer Description Commonwealth of Virginia  
 Data Reporting Period 7/92 - 6/97

Source Type	Present in reporting area	Number of sites in area	Number of sites that are listed and/or have confirmed releases	Number with confirmed groundwater contamination	Contaminants	Number of site investigations (optional)	Number of sites that have been stabilized or have had the source removed (optional)	Number of sites with corrective action plans (optional)	Number of Sites with active remediation (optional)	Number of sites with cleanup completed (optional)
NPL		20	20	14	(A)					
CERCLIS (non-NPL)		200+								
DOD/DOE (NPL) - (NPL)		8	8	8	(B)					
DOD/DOE(nonNPL)		25	25	15						
LUST		7,575	7,575		petroleum hydrocarbons					
RCRA Corrective Action	PERMITTED	12	11	11	40CFR APP IX	12	1	5	2	0
	UNPERMITTED	17	12	12	40CFR APP IX	17	0	-	0	0
Underground Injection										
State Sites										
Nonpoint Sources										
Other (specify)										

**Source Type Abbreviations**

NPL - National Priority List  
 CERCLIS (non-NPL) - Comprehensive Environmental Response, Compensation, and Liability Information System  
 DOE - Department of Energy  
 DOD - Department of Defense  
 LUST - Leaking Underground Storage Tanks  
 RCRA - Resource Conservation and Recovery Act

**Contaminant Type**

(A) listed and characteristic hazardous waste  
 (B) metals, halogenated organics, POL,PCB, Pesticides

## APPENDIX A

### CLEAN WATER ACT SECTIONS

#### Sec. 305. Water Quality Inventory

(b)(1) Each State shall prepare and submit to the Administrator by April 1, 1975, and shall bring up to date by April 1, 1976, and biennially thereafter, a report which shall include-- (A) a description of the water quality of all navigable waters in such State during the preceding year, with appropriate supplemental descriptions as shall be required to take into account seasonal, tidal, and other variations, correlated with the quality of water required by the objective of this Act (as identified by the Administrator pursuant to criteria published under section 304(a) of this Act) and the water quality described in subparagraph (B) of this paragraph; (B) an analysis of the extent to which all navigable waters of such State provide for the protection and propagation of a balanced population of shellfish, fish, and wildlife, and allow recreational activities in and on the water; (C) an analysis of the extent to which the elimination of the discharge of pollutants and a level of water quality which provides for the protection and propagation of a balanced population of shellfish, fish, and wildlife and allows recreational activities in and on the water, have been or will be achieved by the requirements of this Act, together with recommendations as to additional action necessary to achieve such objectives and for what water such additional action is necessary; (D) an estimate of (i) the environmental impact, (ii) the economic and social costs necessary to achieve the objective of this Act in such State, (iii) the economic and social benefits of such achievement, and (iv) an estimate of the date of such achievement; and (E) a description of the nature and extent of nonpoint sources of pollutants, and recommendations as to the programs which must be undertaken to control each category of such sources, including an estimate of the costs of implementing such programs. (2) The Administrator shall transmit such State reports, together with an analysis thereof, to Congress on or before October 1, 1975, and October 1, 1976, and biennially thereafter.

#### Grants for Sec. 106. Pollution Control Program

(e) Beginning in fiscal year 1974 the Administrator shall not make any grant under this section to any State which has not provided or is not carrying out as a part of its program -- (1) the establishment and operation of appropriate devices, methods,, systems, and procedures necessary to monitor , and to compile and analyze data on (including classification according to eutrophic condition), the quality of navigable waters and to the extent practicable, ground waters including biological monitoring; and provision for annually updating such data and including it in the report required under section 305 of this Act;

#### Sec. 204. Limitations and Conditions

(a) Before approving grants for any project for any treatment works under section 201(g)(1) the Administrator shall determine -- "that (A) the State in which the project is to be located (i) is implementing any required plan under section 303(e) of this Act and the proposed treatment works are in conformity with such plan, or (ii) is developing such a plan and the proposed treatment works will be in conformity with such plan, and (B) such State is in compliance with section 305(b) of this Act;"

#### Sec. 314. Clean Lakes

(a) Each State shall prepare or establish, and submit to the Administrator for his approval --

"(A) an identification and classification according to eutrophic condition of all publicly owned lakes in such State; "(B) a description of procedures, processes, and methods (including land use requirements), to control sources of pollution of such lakes; "(C) a description of methods and procedures, in conjunction with appropriate Federal agencies, to restore the quality of such lakes; "(D) methods and procedures to mitigate the harmful effects of high acidity, including innovative methods of neutralizing and restoring buffering capacity of lakes and methods of removing from lakes toxic metals and other toxic substances mobilized by high acidity; "(E) a list and description of those publicly owned lakes in such State for which uses are known to be impaired, including those lakes which are known not to meet applicable water quality standards or which require implementation of control programs to maintain compliance with applicable standards and those lakes in which water quality has deteriorated as a result of high acidity that may reasonably be due to acid deposition; and "(F) an assessment of the status and trends of water quality in lakes in such State, including but not limited to, the nature and extent of pollution loading from point and nonpoint sources and the extent to which the use of lakes is impaired as a result of such pollution, particularly with respect to toxic pollution.

"(2) SUBMISSION AS PART OF 305(b)(1) REPORT.--The information required under paragraph (1) shall be included in the report required under section 305(b)(1) of this Act, beginning with the report required under such section by April 1, 1988